I. Amendments to the Claims

The listing of claims below will replace all prior versions and listings of claims in the application.

The invention claimed is:

1.   (Currently Amended)   A parametric model-based computer implemented method for customizing ~~ablative surgery~~refractive ophthalmic surgery, comprising:

receiving, with a data receiver of a computer, pre-perturbation data concerning a cornea on which a refractive ophthalmic ~~treatment~~surgery will be performed;

receiving, with a data receiver of the computer, post-perturbation data concerning the cornea on which the refractive ophthalmic ~~treatment~~surgery will be performed;

accessing, with a processor of the computer, a parametric model stored in a computer readable medium, the parametric model storing ~~that stores~~ one or more correlations between ~~one or more of the pre-perturbation data, the post-perturbation data,~~ corneal data and a~~predicted post-operative result~~s, the correlations being associated with suggested adaptations to ablative algorithms~~;

selecting, with a processor of the computer, an ablative surgical algorithm stored in a computer readable medium for use in the surgery, the selection based on one or more correlations between ~~one or more of~~ the pre-perturbation data and predicted post-operative results, one or more correlations between the post-perturbation data and predicted post-operative results, or combinations thereof~~and the one or more correlations stored in the parametric model~~; and

updating, with a processor of the computer, the selected ablative surgical algorithm based on the one or more correlations and one or more of the pre-perturbation data and the post-perturbation data~~and the one or more correlations~~;

wherein the updated surgical algorithm is customized for the cornea on which a refractive ophthalmic surgery will be performed.

2 - 6. (Cancelled)

7.   (Currently amended) The method of claim 1, wherein the pre-perturbation data received comprises one or more of topographic data, pachymetric data, elevation data, ~~total~~ corneal thickness data, corneal curvature data, corneal acoustic response and ultrasonic data, wave front data, ~~and~~ intraocular pressure data, peripheral stromal thickness data, age data, sex data, contact lense data, prior surgical response data, patient visual acuity and visual performance data.

8.   (Currently amended) The method of claim 1, wherein the post-perturbation data received comprises one or more of topographic data, pachymetric data, elevation data, ~~total~~ corneal thickness data, corneal curvature data, corneal acoustic response and ultrasonic data, wave front data, flap thickness data, ~~and~~ intraocular pressure data, peripheral stromal thickness data, age data, sex data, contact lense data, prior surgical response data, patient visual acuity and visual performance data.

9 - 10. (Cancelled)

11.   (Currently amended) The method of claim 1, implemented in a system for updating an ablation surgical algorithm, comprising:

a data receiver for receiving ~~a corneal data~~data concerning a cornea on which a refractive ophthalmic surgery will be performed;

a computer readable medium having stored thereon a parametric model ~~stored in the system~~ for storing correlations between ~~the~~ corneal data, a post-operative result and an ablation surgical algorithm update; and

an ablation algorithm processor for updating the ablation surgical algorithm based, at least in part, on the received corneal data and the correlations.

12.   (Currently amended)   The method of claim 11, wherein the corneal data received comprises ~~at least~~ one or more of corneal acoustic response and ultrasonic data, patient visual acuity and visual performance data, topographic data, pachymetric data, elevation data, ~~total~~ corneal thickness data, corneal curvature data, wave front data, ~~and~~ intraocular pressure data, flap thickness data, peripheral stromal thickness data, age data, sex data, contact lense data, and prior surgical response data ~~measured before a cornea is cut~~.

13.   (Currently amended)   The method of claim ~~11~~52, wherein the corneal data received ~~comprises at least one of corneal acoustic response and ultrasonic data, patient visual acuity and visual performance data, topographic data, pachymetric data, elevation data, total corneal thickness data, corneal curvature data, wave front data, and intraocular pressure data is measured~~is data acquired before a cornea is ablated, before a cornea is cut, before a cornea is scraped, or before a corneal epithelial layer is peeled.

14. - 15.   (Cancelled)

16.   (Currently amended)   The method of claim ~~11~~52, wherein the corneal data received ~~comprises at least one of corneal acoustic response and ultrasonic data, patient visual acuity and visual performance data, patient halo effect and contour sensitivity data, topographic data, pachymetric data, elevation data, total corneal thickness data, corneal curvature data, wave front data, intraocular pressure data, flap thickness data, and refractive data measured~~is data acquired after a cornea is cut, after a cornea is ablated, after a cornea is scraped, or after a corneal epithelial layer is peeled.

17 - 23. (Cancelled)

24. (Currently Amended)   The method of claim [[1]]50 implemented in a system for updating the parametric model, comprising:

    a data receiver ~~that receives~~for receiving at least one of the pre-perturbation data, the post-perturbation data, a post-ablation data concerning the cornea on which the refractive opthalmic surgery was performed, and a patient visual performance data concerning the cornea on which the refractive opthalmic surgery was performed; and

    a data integrator that selectively updates the parametric model based, at least in part, on at least one of, the pre-perturbation data, the post-perturbation data, the post-ablation data, and the patient visual performance data.

25. (Currently amended) The method of claim 1, ~~wherein the pre-perturbation data comprises a first set of corneal measurements, and the post-perturbation data comprises a second set of corneal measurements; and~~ wherein ~~selective~~ updating of the ablative surgical algorithm is based on the pre-perturbation data and one or more ~~first~~ correlations between the pre-perturbation data

and one or more predicted post-operative results~~, where the correlations are retrievable from the parametric model~~.

26. (Currently amended) The method of claim ~~25~~7, wherein the <u>pre-perturbation data received is acquired by one or more of</u> ~~first set of corneal measurements comprises at least one of corneal acoustic response and ultrasonic data, patient visual acuity and visual performance data, topographic data, pachymetric data, elevation data, corneal thickness data, corneal curvature data, wave front data, intraocular pressure data, peripheral stroma thickness data, an age datum, a sex datum, contact lens use data, and prior surgical response data by at least one of~~ corneal topography, optical coherence tomography, wave front analysis, ultrasound, and patient interview.

27. (Currently amended) The method of claim ~~25~~8, wherein the <u>post-perturbation data received is acquired by one or more of</u> ~~second set of corneal measurements comprises at least one of corneal acoustic response and ultrasonic data, patient visual acuity and visual performance data, topographic data, pachymetric data, elevation data, corneal thickness data, corneal curvature data, wave front data, intraocular pressure data, peripheral stroma thickness data, an age datum, a sex datum, contact lens use data, and prior surgical response data by at least one of~~ corneal topography, optical coherence tomography, wave front analysis, ultrasound, and patient interview.

28 - 29. (Cancelled)

30. (Currently amended)   The method of claim 1, comprising:

holding <u>pre-operative corneal</u> ~~the pre-perturbation~~ data in a first <u>data</u> field of a data structure of a computer readable medium for updating the ablative surgical algorithm;<u> wherein the pre-operative corneal data is selected from one or more of the received pre-perturbation data and the received post-perturbation data;</u>

holding the predicted post-operative result<u>s</u> in a second <u>data</u> field of the data structure[[,]]<u>;</u> where<u>in</u> the predicted post-operative results are derived from the <u>one or more</u> pre-operative corneal ~~measurements~~<u>data</u> via one or more correlations stored in the parametric model; and

holding information concerning one or more updates to the ablative surgical algorithm in a third field of the data structure[[,]]<u>;</u> where<u>in</u> the updates are derived from the pre-operative corneal ~~measurements~~<u>data</u>, the predicted post-operative results<u>,</u> and the <u>one or more</u> correlations.

31 - 33. (Cancelled)

34. (Currently amended) The method of claim 1 implemented in a computer data signal embodied in a transmission medium, comprising:

a first set of instructions for receiving corneal ~~measurements~~<u>data</u> selected from <u>one or more of the pre-perturbation data and the post-perturbation data</u>;

a second set of instructions for selecting an ablative algorithm based upon one or more correlations between the corneal ~~measurements~~<u>data</u> and a predicted post-operative result, the correlations being stored in a parametric model and associated with suggested adaptations to the ablative algorithm; and

a third set of instructions for updating the ablative algorithm based on the corneal ~~measurements~~data and the one or more correlations

35 - 37. (Cancelled)

38. (Currently amended) The method of claim 1, comprising:

storing in a memory of a laser eye surgery apparatus an ablation program that controls a laser of the apparatus for ablating corneal tissue;

storing in the memory ~~a~~ corneal ~~measurement~~ data selected from one or more of the pre-perturbation data and the post-perturbation data;

storing in the memory the parametric model that stores a correlation between the corneal ~~measurement~~ data and the predicted post-operative result; ~~and~~

adapting with a processor of the apparatus the ablation program based on the correlation; and

storing in the memory the adapted ablation program.

39. (Cancelled)

40. (Previously presented) A computer readable medium storing computer executable instructions operable to perform computer executable portions of the method of claim 1.

41. (Currently amended) A system for updating an ablation algorithm for customizing ~~ablative~~refractive ophthalmic surgery, comprising:

a data receiver for receiving pre-perturbation data and post-perturbation data concerning a cornea on which a refractive ophthalmic ~~treatment~~surgery will be performed;

a computer readable medium having stored thereon a parametric model for storing correlations between one or more of the pre-perturbation data, the post-perturbation data, and a predicted post-operative result, the correlations being associated with suggested adaptations to ablative algorithms; and

~~an ablation algorithm~~ processor for (i) selecting an ablative algorithm for use in the surgery based on one or more of the correlations stored in the parametric model and (ii) updating the ablation algorithm based on one or more of the pre-perturbation data, the post-perturbation data, and the one or more correlations.

42.   (Currently amended)   The system of claim 41, wherein the data receiver is adapted to receive corneal data selected from one or more of ~~comprises at least one of~~ corneal acoustic response and ultrasonic data, patient visual acuity and visual performance data, topographic data, pachymetric data, elevation data, ~~total~~ corneal thickness data, corneal curvature data, wave front data, ~~and~~ intraocular pressure data, flap thickness data, peripheral stromal thickness data, age data, sex data, contact lense data, and prior surgical response data ~~measured before a cornea is cut~~.

43.   (Currently amended)   The system of claim 41 54, wherein the corneal data ~~comprises at least one of corneal acoustic response and ultrasonic data, patient visual acuity and visual performance data, topographic data, pachymetric data, elevation data, total corneal thickness data, corneal curvature data, wave front data, and intraocular pressure data measured~~ is acquired before a

cornea is ablated, before a cornea is cut, before a cornea is scraped, or before a corneal epithelial layer is peeled.

44 - 45. (Cancelled)

46. (Currently amended) The system of claim 41~54~, wherein the corneal data ~comprises at least one of corneal acoustic response and ultrasonic data, patient visual acuity and visual performance data, patient halo effect and contour sensitivity data, topographic data, pachymetric data, elevation data, total corneal thickness data, corneal curvature data, wave front data, intraocular pressure data, flap thickness data, and refractive data measured~is acquired after a cornea is cut, after a cornea is ablated, after a cornea is scraped, or after a corneal epithelial layer is peeled.

46. - 49. (Cancelled)

5~1~50. (Currently amended) The method of claim 1, comprising ablating corneal tissue from a cornea in accordance with the updated corneal ablative algorithm.

5~2~51. (Currently amended) The method of claim 2~5~1, ~comprising selectively~ wherein updating of the ~corneal~ ablative surgical algorithm is based on the post-perturbation data and one or more ~second~ correlations between the post-perturbation data and one or more predicted post-operative results~, where the second correlations are retrievable from the parametric model; and~

~   ablating corneal tissue from a cornea in accordance with the updated corneal ablative algorithm~.

52. (New) The method of claim 12, wherein the corneal data received is data acquired by one or more of corneal topography, optical coherence tomography, wave front analysis, ultrasound, and patient interview.

53. (New) The method of claim 1, wherein updating of the ablative surgical algorithm is based on (i) the pre-perturbation data and one or more correlations between the pre-perturbation data and one or more predicted post-operative results; and (ii) the post-perturbation data and one or more correlations between the post-perturbation data and one or more predicted post-operative results.

54. (New) The system of claim 42, wherein the corneal data is acquired by one or more of corneal topography, optical coherence tomography, wave front analysis, ultrasound, and patient interview.